

### REMARKS

Reconsideration of this application is requested.

Upon entry of this amendment, claims 1-2, 5 and 7-12 will be pending for the Examiner's consideration. Claim 6 has been canceled in this amendment, claims 3 and 4 having previously been canceled. Claim 1 has been amended to add the limitation that the high polymer compound is "an imidated acrylic acid and maleic anhydride copolymer obtained by imidating a copolymer of maleic anhydride and acrylic acid." Support for this amendment can be found in the specification at, for example, page 13, lines 7-12. Claim 1 has also been amended to delete language added at the time of the previous amendment which recited that the "high polymer compound does not comprise a nonionic polymer compound." Claim 7 has been amended to adjust the upper limit of molecular weight of the high polymer compound from 1,000,000 to 60,000. Support can be found in the specification in, for example, Table 1, example 4. Claim 7 was also amended to delete the language "by ammonia" which pertains to the alpha-olefin being imidated "by ammonia." Claim 7 was further amended to delete language that the "high polymer compound does not comprise a nonionic polymer compound," which was added at the time of the previous amendment. New claims 10-12 have been added. New claim 10 is essentially amended claim 7 with the pre-amended average molecular weight range (*i.e.*, 1,000 to 1,000,000) and with the additional limitation that the "imidation ratio is 1 to 35 molar percent." Support for the additional limitation can be found in the specification in, for example, Table 1, example 2. New claims 11 and 12 depend from claim 10 and add the same additional limitations as those in claims 8 and 9. No new matter has been added.

In accordance with the Examiner's suggestion in the final Office Action, the abstract has been amended to delete language regarding the high polymer compound not containing a non-ionic polymer. Tables 1 and 2 have been amended to replace the term "isobutylene" with "isobutylene."

With regard to the objections in the specification, applicants note the aforementioned amendments to the abstract and specification which should obviate the objections.

With regard to the objections to claim 1 regarding the language "selected from among," applicants note that the amendments to claim 1 have deleted this language. The objection is thus obviated.

### **35 U.S.C. § 112 Rejections**

The Examiner rejected claims 1-2 and 5-9 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. More specifically, the Examiner alleged that the language in claims 1 and 7 teaching that “said high polymer compound does not comprise a nonionic polymer compound” is not supported in the specification. Applicants note that this language, which was added during the previous amendment, has been deleted from both claims 1 and 7. Accordingly the rejection of claims 1 and 7, as well as the claims that depend therefrom, has been obviated.

### **35 U.S.C. § 103**

The Examiner rejected claims 1-2 and 5-9 under 35 U.S.C. § 112 as being unpatentable as obvious over JP 2003-206493 (“JP-493”) in view of JP 2002-265974 (“JP-974”). Applicants respectfully request reconsideration in view of the amendments to independent claims 1 and 7.

JP-493 discloses a water soluble lubricant that contains a sodium salt of an anionic polymer (such as an acrylic acid-maleic acid copolymer) having an average molecular weight of 10,000 to 1,000,000 in an amount of 1 to 50 % of the lubricant and a sodium salt of an anionic polymer having a molecular weight of 500 to 10,000 (such as a sodium salt of an isobutylene-maleic acid copolymer) in an amount of 0.2-30%. JP-493 Abstract. JP-493 does not disclose imidating the copolymer.

JP-974 discloses a water soluble lubricant for warm or hot plastic working which comprises an anionic polymer compound having a molecular weight of 500 to 1,000,000 and a nonionic polymer compound having an average molecular weight of 500 to 1,000,000. JP-974, Abstract and paragraphs [0005], [0006], [0015], and [0016]. JP-974 does not disclose “an imidated acrylic acid and maleic anhydride copolymer.” *Id.*, paragraph 21.

The present invention is directed to a water-soluble lubricant for warm or hot metal forming that possesses excellent lubricity for reducing the friction between a die and a workpiece, has excellent release properties for reducing the contact time, has less of an adverse effect on the operating environment and operating efficiency than conventional lubricants, and can be readily treated as wastewater after use. In one embodiment, the water-soluble lubricant includes a high polymer compound comprising at least one imide group and whose weight-average molecular weight is 1,000 to 1,000,000, wherein said high polymer

compound is (A) an imidated acrylic acid and maleic anhydride copolymer obtained by imidating a copolymer of maleic anhydride and acrylic acid.

Applicants respectfully submit that the combination of JP-493 and JP-974 does not establish a *prima facie* case of obviousness for the following reasons.

First, Applicants note that the combination of JP-493 and JP-974 does not teach or suggest each and every limitation of the claimed invention. With respect to claim 1, applicants respectfully submit that neither JP-493 nor JP-974 teaches or suggests a high polymer compound which is an imidated acrylic acid and maleic anhydride copolymer. As discussed above, JP-493 does not teach or suggest imidating any copolymers, much less an acrylic acid maleic anhydride copolymer. Moreover, JP-974 does not teach or suggest use of an acrylic acid and maleic anhydride copolymer. Accordingly, the combination of JP-493 and JP-974 does not teach or suggest each and every limitation of claim 1, including that of an imidated acrylic acid and maleic anhydride copolymer. Consequently, the combination of JP-493 and JP-974 does not render claim 1 obvious.

With respect to independent claim 7, we first note that this claim recites “[a] water-soluble lubricant for warm or hot metal forming, comprising a high polymer compound comprising at least one imide group and whose weight-average molecular weight is 1,000 to 60,000, wherein said high polymer compound is (B) an imidiated alpha-olefin and maleic anhydride copolymer obtained by imidating part of a copolymer of maleic anhydride and alpha-olefin.” Applicants respectfully submit that the combination of JP-493 and JP-974 does not teach or suggest a high polymer compound comprising at least one imide group with a weight-average molecular weight of 1,000 to 60,000. In the case of an imidated isobutylene/maleic anhydride copolymer as taught in JP-974, the molecular weight is 90,000, which is outside of and above the 1,000 – 60,000 range recited in claim 7. Accordingly, the combination of JP-493 and JP-974 does not teach or suggest each and every limitation of claim 7, and thus does not render claim 7 obvious.

With respect to independent claim 10, we first note that this claim recites “a water-soluble lubricant for warm or hot metal forming, comprising a high polymer compound comprising at least one imide group and whose weight-average molecular weight is 1,000 to 1,000,000 and the imidation ratio is 1 to 35 molar percent, wherein said high polymer compound is (B) an imidated alpha-olefin and maleic anhydride copolymer obtained by imidating part of a copolymer of maleic anhydride and alpha-olefin.” Applicants respectfully

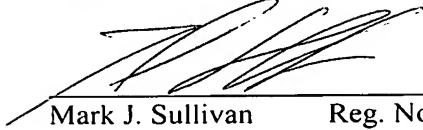
submit that the combination of JP-493 and JP-974 does not teach or suggest a high polymer comprising an imide group with an imidation ration of 1-35 molar percent. As previously discussed, JP-493 does not teach or suggest imidating the polymer. JP-974 does not teach or suggest an imidation ratio of 1-35 molar percent. Rather, JP-974 teaches an imidated isobutylene/maleic anhydride copolymer with an imidation ration of 50%. Accordingly, the combination of JP-493 and JP-974 does not teach or suggest each and every limitation of claim 10, and thus does not render claim 10 obvious.

There are additional reasons why the combination of JP-493 and JP-974 does not render the above claims obvious. To this end, it should be noted that comparative example 1 of the present application (see Table 2 of the specification) teaches a formulation that is excellent in lubricity and suppresses the deterioration of the working environment. This same formulation, however, is inferior to formulations covered in examples 1-6 in terms of its amenability to being readily treated as wastewater. This indicates that the effects of, on the one hand, lubricity and suppression of the deterioration of the working environment and, on the other hand, the wastewater treatment property are different, and that the latter effect cannot be predicted from the former effects. In view of the above described differences, one of ordinary skill in the art would not have a reasonable expectation of success in combining the formulations of JP-493 and JP-974, neither of which teaches a formulation which can be readily treated as wastewater, to arrive at the water-soluble lubricants claimed in the present invention. Nor would one of ordinary skill in the art be motivated to combine JP-493 with JP-974, since neither reference teaches lubricant formulations which can be easily treated as wastewater and thus one of ordinary skill would not look to JP-974 to imidate the copolymer of JP-493. For the above additional reasons, the combination of these two prior art references does not render obvious claims 1, 7 and 10 of the present invention.

As noted above, claims 2 and 5 depend from claim 1, claims 8 and 9 depend from claim 7 and claims 11 and 12 depend from claim 10. Since the combination of JP-493 and JP-974 does not render obvious independent claims 1, 7 and 10, it cannot render obvious dependent claims 2, 5, 8-9 and 11-12.

Reconsideration with allowance is requested.

Respectfully submitted,



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